HIGH-THROUGHPUT PLANT PHENOTYPE ACQUISITION AND ANALYSIS PLATFORM

The High-Throughput Plant Phenotyping Platform is designed for large- and medium-scale greenhouses, combining plant phenotypic image acquisition and parameter analysis. Using a conveyor system, plants are transported to an imaging chamber for efficient phenotypic data capture through a plant-sensor-analysis workflow. The platform supports multiple imaging units, including 2D visible light, 3D visible light, and hyperspectral, enabling mutant screening, growth tracking, and research on plant changes under stress conditions like heat, salinity, disease, and pests. It is ideal for research in genetic breeding, molecular biology, plant physiology, plant pathology, ecology, environmental science, and plant protection.

2D 3D Hyperspectral

Three in one

Automated Conveyor Unit + Multidimensional Imaging Unit + Edge Computing and Analysis Unit + Data Management Unit

Automated Conveyor Unit

Speed	13m/min Adjustable	Positioning Accuracy	≤ ± 2mm	Identification	Electronic, RFID for plant identification and positioning

Multidimensional Imaging Unit

Visible Light Imaging Unit	
Imaging Sensor	High resolution RGB lens
Resolution	5120×5120
Data Transfer	10-Gigabit ethernet
2D Analysis Time	<5s / plant
3D Analysis Time	<7min / plant
Pixel Size	2.5μm×2.5μm
Imaging Platform	360 degree rotating platform
Imaging Height	Multi-stage imaging with customizable height.
Lighting Source	Side LED

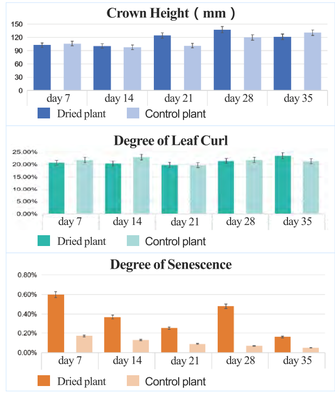
Hyperspectral Imaging Unit	
Imaging Wavelength Range	400-1000nm
Lighting Source	Low-flash, halogen light source
Incident Slit Width	25μm
Dynamic Range	12bit
Imaging Height	Customizable height
Data Transfer	USB 3.0 / Gigabit ethernet (Optional)
Analysis Time	5s / plant
Pixel Size	5.86μm×5.86μm
Spectral Resolution	2.5nm
Spectral Bands	1200 bands
Resolution	1920x1920

Edge Calculation and Analysis Unit

Automatically calculates various common vegetation indices, chlorophyll content, nitrogen content, and other agronomic biological indicators. Each module supports custom-designed models to analyze specific stress responses or disease levels according to customer requirements.

Data Management Unit

the system is equipped with professional analysis software, which supports data management through self-constructed experimental engineering, and data can be viewed, analyzed and exported according to different imaging units, which facilitates data management throughout the experimental cycle according to different experimental topics.



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Agriculture related

Laboratory related

Zhejiang TOP Cloud-Agri Technology Co., Ltd.

2D 3D Hyperspectral

Plant Language Translator

DIGITAL PHENOTYPE ACQUISITION AND ANALYSIS SYSTEM FOR POTTED PLANTS (HIPS)

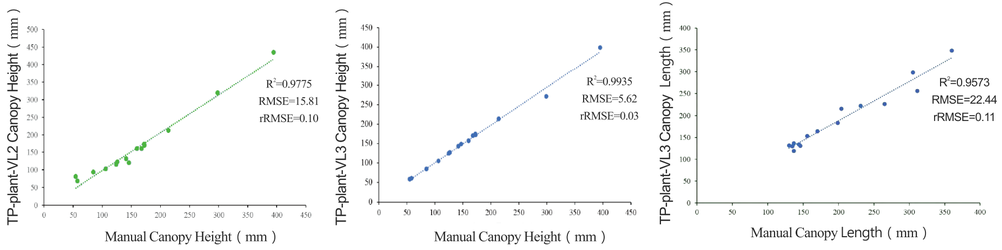
For phenotypic measurement and resolution of potted plants. There are three imaging units available: 2D, 3D and hyperspectral. It can screen and identify mutants, record the growth status of plants, and also study the morphology, color, texture, growth, and component content changes of plants under adversity conditions such as high temperature, high salt, disease, and insect pests. It is suitable for genetic breeding, molecular biology, plant physiology, plant pathology, ecology, environmental science, plant protection and other research fields.

Zhejiang TOP Cloud-Agri Technology Co., Ltd.

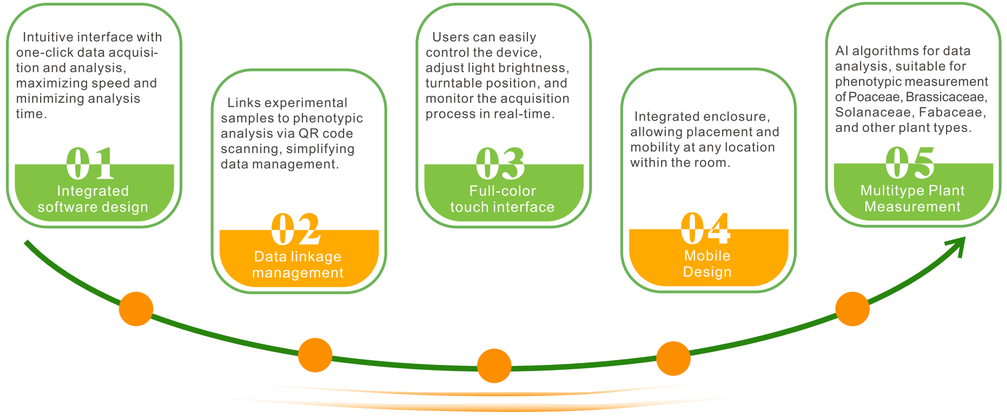
Model Comparison

Model	Imaging Unit	Light Source	Acquisition Time	Analysis Time
TP-plant-VL2	2D	Uniform Diffuse LED Surface Light Source	50 seconds / plant	10 seconds/plant
TP-plant-VL3	3D	Uniform Diffuse LED Surface Light Source	60 seconds / plant	3 min/plant
TP-plant-HIPS	Hyperspectral	Low-Frequency Flicker High-Quality Halogen Light Source	30 seconds / plant	30 seconds/plant

Manual VS. Machine Measurement Data Comparison



Product Feature



TP-plant-VL2

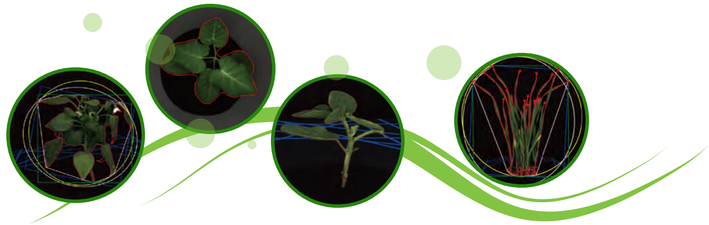
2D 3D Hyperspectral

Introduction

Equipped with built-in artificial intelligence algorithms, the system automatically performs image preprocessing and segmentation, calculates phenotypic traits such as plant architecture, color distribution, and texture features, and analyzes plant growth conditions and health status. It is primarily used for plant morphology analysis (screening for mutants and identifying stress-tolerant genotypes under adverse conditions) and leaf spot recognition (screening for disease-resistant genotypes under disease treatment).

Imaging Specifications

Contour Area (Top View, Side View), Convex Hull Area (Top View, Side View), Canopy Height, Canopy Width, Leaf Curling Degree, Leaf Apex Count, Greenness Retention, Senescence Degree, Compactness, Eccentricity, etc.



Visible Light 2D Analysis Results

TP-plant-VL3

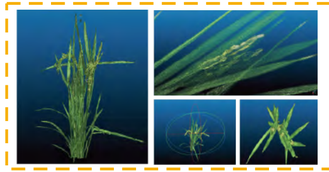
2D 3D Hyperspectral

Introduction

Using stereoscopic vision and MVS reconstruction, the system generates high-precision 3D plant models, calculates phenotypic traits like architecture, canopy structure, color distribution, and volume, and analyzes plant growth and dynamic changes. It is used for morphology analysis (screening mutants and stress-tolerant genotypes) and growth analysis (monitoring changes under special conditions).

Imaging Specifications

Contour Area (Top View, Side View), Convex Hull Area (Top View, Side View), Canopy Height, Canopy Width, Leaf Curling Degree, Greenness Retention, Senescence Degree, Compactness, Eccentricity, Volume, Biomass, etc.



3D Plant Phenotypic Analysis

Based on the constructed high-precision 3D models, the system comprehensively extracts and analyzes key factor data such as plant volume and surface area, and can also perform full-scale analysis of plant morphological parameters and key traits like color.

TP-plant-HIPS

2D 3D Hyperspectral

Introduction

The Hyperspectral Plant Digital Acquisition and Analysis System uses hyperspectral imaging for plant image capture and phenotypic analysis. It enables non-destructive collection of spectral images, vegetation indices, and component contents from potted plants, facilitating mutant screening and the study of plant growth and component changes under stress conditions such as heat, salinity, disease, and pests. It is ideal for research in genetic breeding, molecular biology, plant physiology, plant pathology, ecology, environmental science, and plant protection.

Imaging Specifications

Plant nutritional analysis (efficient genotype/mutant screening, water and fertilizer use efficiency), disease recognition (screening for resistant genotypes), and chlorophyll analysis (growth status and resistance genotype screening).

Interactive Spectral Analysis

Automatically generates canopy spectral curves, supports region selection for spectral comparison and analysis.

Vegetation Index & Biological Parameter Analysis

Uses AI algorithms to calculate common indices like NDVI, RVI, and GVI, and analyzes biological parameters such as nitrogen and chlorophyll content using built-in agricultural models.

Customizable Modeling

Allows fast modeling with vegetation indices and custom models for growth, disease, and other factors.

Differential Visualization

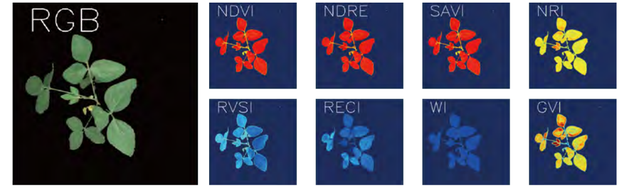
Quantifies and visualizes differences in mutant growth and nutrient use efficiency.

Multitype Stress Experiments

Supports stress tests under conditions like heat, cold, salinity, and drought, and visualizes responses and resistance.

Pest and Disease Analysis

Compares spectral curves of diseased and healthy plant parts to analyze disease severity and occurrence.



Hyperspectral Analysis Results